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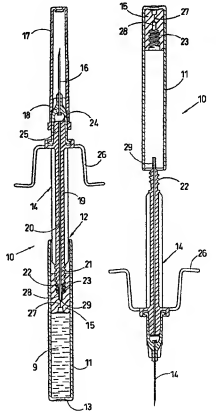
(57) Abstract

A medical substance (9, 92) is contained in a body (11, 82, 123) by a plug which (15, 67, 90, 122) is penetrated rather than removed in order to extract the substance in a sterile manner. The plug (15, 67, 90, 122) has a socket (23, 70, 91) open to the exterior and a connector (14, 60, 82, 120) has a screw threaded nose (22, 62, 95, 121) which engages therein, either by screwing into a complementary thread or by self tapping. The plug (15, 67, 122) may have a pre–cut slit (27, 68, 126) through it from the base of the socket (23, 70) and as the connector screws in a spigot (29, 64, 124) on its extremity works through the slit. A passage (20) through the spigot and nose is then available to the substance. When the connector is unscrewed, the slit closes up. Alternatively, the nose (95) may carry a hollow needle (96) which pierces its way through the plug (90). The plug may be a piston–seal (15, 90, 122) of a syringe or the cap (67) of a bottle (66). The connector may be a transfer device (83, 113) connectable to another body (81, 110) containing a substance to be mixed with the first substance before use.



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Improvements Relating to Fluid Transfer Assemblies

This invention relates to fluid transfer assemblies. It has been developed primarily for the preparation of medical syringes where a liquid medicinal substance is initially kept in a reservoir separated from a transfer device by a piston seal. For use, this piston seal has to be penetrated so that the liquid can pass into a cannula within the transfer device and thence to a needle. It is desirable that, after use, the penetration should be removed, leaving the remainder of the liquid sealed within the reservoir.

Maintaining the piston-seal leak proof during and after penetration has been a problem, but this invention aims to answer it.

According to one aspect of the present invention there is provided a fluid transfer assembly comprising a body with a chamber closed by a resilient plug presenting a socket to the exterior, and a connector with a passage therethrough co-operable with the plug for a leading spigot to enter the socket and penetrate further through the plug to open communication between the passage and the chamber while the portion to the rear of the spigot screws into the socket and forms a seal before the leading end of the spigot enters the chamber.

In one form, the socket has a complementary screw thread for engagement by the screw thread of the connector. But in another form the socket wall is plain and the connector has a self-tapping thread that bites into the relatively soft material of the plug. In the latter case, between the self-tapping thread and the spigot there is preferably a widened portion which can snap through the neck of the socket (into which the screw thread bites) to enter a widened base of the socket to make the connector captive to the plug.

The assembly may include a further body with a chamber closed by a plug, and the connector may then be adapted to fit sealingly to this further body and simultaneously penetrate the plug to put the end of the passage remote from the spigot in communication with the chamber of the further body. The plug of this further body can present a socket to the exterior and the connector can have screw engagement therewith in a manner similar to its engagement with the plug of the first body.

In another possible arrangement the plug of the further body has a thin section penetrable by a sharpened spigot at said remote end of the passage, simultaneous with a snap or press fit of the connector with the further body.

These embodiments with two bodies enable material in the tubular body to be mixed with material in the bottle between the self-tapping thread and the spigot there is preferably a widened portion which can snap through the neck of the socket (into which the screw thread bites) to enter

a widened base of the socket to make the connector captive to the plug.

There may be a pre-cut slit between the base of the socket and the inner, chamber end of the plug that self-seals in the absence of the spigot but which allows the penetration of the spigot. The socket will preferably have a central narrow recess in its base leading to the pre-cut slit, the spigot fitting snugly into this recess before it is advanced into the slit.

Alternatively the spigot may be of needle form so that the screw action will cause the needle tip to pierce the plug between the base of the socket and the inner, chamber end of the plug.

Generally the body will be tubular. The plug may be slidable therein but resistant to rotation, so that the connector can screw into it. Thus the body and connector may form a syringe, the connector having a needle at the opposite end of the passage from the spigot.

Alternatively the body may be a bottle, the plug sealing the mouth of the bottle.

Conveniently, the connector has a valve to open or close the passage.

In another version with two bodies whose contents are to be mixed the end of the passage remote from the spigot opens into a socket that sealingly receives a glass ampoule.

Also, in another version where the body and connector form a syringe, the body has a needle at the end opposite that which the connector enters to mate with the plug.

According to another aspect of the present invention there is provided an assembly for making the needle of a syringe safe after use, the assembly comprising a needle holder that fits tightly to the forward end of the body of the syringe, and a sleeve which houses the holder and which, in an in use position, shrouds said forward end and secures to the body of the syringe rearwardly of the holder, a needle of the holder then projecting forwardly clear of the sleeve, wherein the sleeve is removable forwardly from the syringe body, that removal dislodges the needle holder when the sleeve has moved sufficiently to shroud the needle, and the needle holder is retained by the sleeve with the needle shrouded when removal is complete.

The rear end of the sleeve is conveniently reduced to present an internal shoulder which dislodges the needle holder on removal.

The reduced rear end portion of the sleeve may be a tight fit onto the body of the syringe, in which case the holder may fit firmly into the sleeve immediately forward of the shoulder and thereby be retained after removal.

Alternatively, the reduced rear end portion of the sleeve may screw onto the body of the syringe, in which case the sleeve may be internally screw threaded forward of said shoulder and the needle holder may have a formation that engages this thread as the sleeve is unscrewed from the body of the syringe, the retention of the needle holder after removal being by the engagement of said formation with the screw thread.

Normally, a needle cap will cover the needle before use, its rear end being retained between the needle holder and the sleeve. It will simply be pulled clear to expose the needle.

For a better understanding of the invention some embodiments will now be described, by way of example, with reference to the accompanying drawings, in which:

Figures 1A and 1B are longitudinal axial sections of a syringe respectively before and after use,

Figure 2 is an axial section of a piston-seal for the syringe of Figure 1,

Figures 3A to 3E show, in axial section of part of the syringe, a sequence of movements as the syringe is prepared for use,

Figures 4A and 4B are axial sections of part of another syringe in different states of engagement of its piston-seal by a transfer device,

Figures 5A and 5B are axial sections of the forward portion of a further syringe before and after use, with a removable needle assembly,

Figures 6A and 6B are axial sections of the forward portion of yet another syringe before and after use, with a removable needle assembly,

Figures 7A to 7E show a yet further syringe in axial section with arrangements for a two-component dose,

Figures 8A, 8B and 8C are respectively axial sections of a bottle, a transfer device and syringe,

Figures 9A, 9B, 9C and 9D are axial sections of a

bottle, transfer device and syringe in stages preparatory to and in use,

Figures 10A, 10B and 10C are respectively axial sections of an ampoule before use, a transfer device, and part of the ampoule and transfer device ready for use, and

Figures 11A, 11B, 11C, 11D and 11E are axial sections of a syringe and bottle in a preparatory sequence without a transfer device.

Referring to Figures 1A and 1B, a liquid substance 9 to be injected by a syringe 10 is held in a tube 11 open at its forward end 12 and closed at its rear end 13. It may be transparent or translucent and marked with a scale by which to gauge the amount of liquid 9 within. A transfer device 14 is co-axially aligned with this tube and carries at its rear end within the tube an elastomeric piston-seal 15 which traps the liquid 9. At its forward end, the device 14 carries a needle 16, initially protected by a cap 17 which engages over a needle holder 18.

The transfer device 14 is basically a rod 19 with a co-axial cannula 20. Its rear end 21 has a screw thread 22 which enables it to be screwed into a socket 23 of the piston-seal 15 with a complementary thread. The socket faces towards the open, forward end 12 of the tube 11. The forward end 24 of the device 14 develops into a frusto-conical portion 25 over which the skirt of the needle holder 18 tightly fits. Lateral wings 26 are provided just to the rear of the portion 25 to serve as a grip in use.

As best seen in Figures 2 and 3, the piston-seal 15 has

a pre-cut slit 27 from a central recess 28 in the base of the socket 23 to the centrally recessed rear end of the piston-seal. The rod 19 is extended beyond the screw thread 22 by a narrow spigot 29 which can closely fit the recess 28. Externally, the piston-seal 15 has annular ribs or beads 30, 31 and 32 whose outer diameters are greater than the internal diameter of the tube 11. But the resilience of the piston-seal allows it to be inserted through the forward end 12, and these ribs or beads are compressed and flattened out to give a leakproof peripheral seal. At the same time the slit 27 is compressed to ensure that is liquid-tight.

The rod 19 of the transfer device 14 is fitted as shown in the series of Figure 3, the screw thread 22 making a leak proof seal with the thread of the socket 23 by the time the spigot 29 reaches the mouth of the recess 28 (Fig. 3A). The rod 19 is screwed further (Fig.3B) until the spigot 29 bottoms in the recess 28, and then more, forcing the split 27 to open (Fig.3C). This is continued (Figs. 3D and 3E) until the spigot 29 is through into the recess in the rear end of the piston-seal 15 and the screw thread 22 is fully home in the socket 23. The liquid 9 thus has access to the needle 16 via the cannula 20, and once the cap 17 has been removed, the syringe 10 can be used.

This operation can be reversed, and the split 27 will close up again on removal of the spigot 29 to keep any remaining liquid 9 secure against leakage. The tightness of the fit of the piston-seal 15 within the tube 11 ensures

that the piston-seal does not rotate while the rod 19 is being screwed in and out. The exhausted syringe 10 with the two main parts separated is shown in Figure 1B.

Figures 4A and 4B show a modification of the rear-end of the rod 19 of the transfer device 14 and the piston-seal 15. Instead of a screw-threaded socket 23 there is a cavity with a funnel mouth 41, a central neck 42 and a wider chamber 43 extended rearwardly by a coned base 44. Between the screw-thread 22 and the spigot 29 there is, going rearwardly, a cylindrical portion 45 with a diameter matching that of the neck 42, and a frusto-conical portion 46 tapering into the base of the spigot, its own base forming a forwardly facing annular shoulder 47. The axial length of the chamber 43 is substantially equal to that of the slit 27.

When offered up, the rod 19 can be forced rearwardly to snap the frusto-conical position 46 through the neck 42, bringing the end of the screw thread 22 into the mouth 41 and the tip of the spigot 29 into the slit 27 (Figure 4A). Rotating the rod 19 forces the screw thread to bite into the neck 42 and advance the spigot 29 through the slit 27 until it emerges to the rear of the piston-seal with the portion 46 nesting in the base 44.

This can be reversed, to re-seal the slit 27, but the shoulder 47 will engage the step between the chamber 43 and the neck 42 to prevent separation of the rod and piston-seal.

Figure 5 shows a modification of Figure 1 in which the

forward end portion 25 of the transfer device 14 is elongated and fitted with a stepped guard sleeve 51. Before and during use the sleeve is retracted against the roots of the wings 26, being retained by the tightness of its fit to the base of the portion 25 and by a narrow internal shoulder 52 behind the base rim 53 of the needle holder 18. For use, the cap 17 is pulled clear of the sleeve 51 leaving that and the needle holder 18 in place and the needle 16 exposed. After use, the sleeve 51 is pulled forwardly and the shoulder 52 snaps past the base rim 53, which later meets a more pronounced internal shoulder 54. At this point the needle 16 is safely within the sleeve 51. Continued forward pulling on the sleeve dislodges the needle holder 18 from the forward end of the transfer device 14, as shown in Figure 5B. The needle 16 is thus within a unit disposable separately from the rest of the device. The rim 53 is a firm fit within the sleeve to the rear of the shoulder 52 and so if the unit is upended the needle will not re-project.

Figure 6 shows a variant of this. The forward end portion 25 is screw threaded from its root up to its slightly tapered extremity over which the needle holder 18 fits. The narrow rear end of the guard sleeve 51, to the rear of the shoulder 54, has a complementary internal thread. Also, between the shoulders 52 and 54 the sleeve is internally screw-threaded and the base rim 53 of the needle holder 18 is shaped to engage in that screw thread. So, instead of simply pulling the sleeve 51 forwardly after

use, it is rotated and the screw action takes it forwards. The needle holder 18 remains fast on the portion 25 with the sleeve 51 being screwed past it until the shoulder 54 reaches the rim 53, when the final unthreading turns free the needle holder 18 from the portion 25. The rim 53 keeps the needle holder 18 captive within the sleeve, and the needle 16 safe, as shown in Figure 6B, by its engagement with the internal screw thread.

Figures 7A, 7B, 7C, 7D and 7E show a syringe assembly adapted for mixing two components, for example a liquid solvent and a solid active substance, in particular a lyophilisate, before injection.

The needle 16 is not fitted to a holder but is inserted into the forward end of the cannula 20, where it is cemented to project from the leading end portion 25, whose outer surface is a Luer cone. An adaptor 60 has an annular skirt 61 whose internal surface is a complementary Luer cone to fit over the portion 25 while the needle enters a co-axial passage within a nose 62. This matches the rear end of the transfer device described above, having an external screw thread 63 reducing to a spigot 64 in which the tip of the needle 16 is a close fit when the adaptor is in place. In Figure 7A, a protective cap 65 is shown pressed into place over the spigot 64.

A bottle 66 with the solid to be mixed has its neck plugged by an insert 67 similar to the piston-seal 15 in having a pre-cut slit 68 between its underside and a central recess 69 at the base of a screw threaded socket 70.

For mixing, the cap 65 is removed and the adaptor 60 is screwed into the insert 67, the spigot 64 opening its way through the slit 68. The solvent can then be injected into the bottle 66 to mix with the solid, and that mixture is then drawn back into the tube 11 (Figure 7D). The bottle 66 is pulled away (Figure 7E), taking the adaptor 60 with it, leaving the needle 16 exposed and ready for injection.

Another syringe assembly where the components are mixed before injection is shown in Figures 8A, 8B and 8C and comprises a sealed and capped bottle 81, a syringe 82 and a coupling element 83.

The bottle 81 contains an active substance 84 and its sealing stopper 85, held by a crimped cap 86, has a central thin zone 87.

The syringe 82 is fitted with a cap 88 over its needle 89 at the distal end, and a piston-seal 90 with a screw-threaded socket 91 opening rearwardly confines liquid 92. This liquid may be inert and simply serve as a vehicle for the active substance 94, but it could also have an active function itself.

The coupling element 93 is basically a rod 93 with a co-axial cannula 94 which at one, externally screw-threaded end 95 receives a hollow needle 96. This screw end fits the socket 91. Towards the other, proximal end 97 there is a stop valve 98 with an operating handle 99 which can selectively open or obstruct the cannula 94. The cannula extends into a hollow spike 100, co-axially within a cylindrical cap 101 at the end 97. The interior of the cap

is thickened towards the mouth to form a shoulder 102. This enables the cap 101 to snap securely onto the neck of the bottle 81 while the spike 100 simultaneously pierces the thin zone 87. The snap fit is intended to be permanent, although in some circumstances disconnection may be made an option.

A first possible use, with the substance 84 a lyophilisate, is shown in Figures 9A to 9D. The needle 89 of the syringe is not shown in Figures 9A to 9C. The components 81, 82 and 83 are fitted together with the stop valve 98 closed, the needle 96 piercing the piston-seal 90 and the spike 100 the thin zone 87 of the stopper 85 (Figure 9A). Then the valve 98 is opened and the liquid 92 may flow into the bottle 81 to mix with substance 84.

The assembly is inverted and the user compresses it axially (Figure 9B), the advance of the piston-seal 90 towards the capped end of the syringe 82 forcing the liquid 92 along the cannula 94 and into the bottle 81 to create a solution 103. The space 104 above this solution is therefore now gas under pressure. The axial compression is then released and the gas expands and forces the solution 103 back down the cannula 94 and into the syringe 82 (Figure 9C). The piston-seal 90 is forced back, and when it registers with a desired mark on a scale (not shown) on the transparent wall of the syringe, the valve 98 is closed. The syringe 82 now contains a precise, selected dose, the balance of the solution being confined in the bottle 81 under reduced pressure.

The cap 88 is then removed and the needle 89 is thrust into the end piece 105 of a perfusion bag 106. The syringe is then operated to discharge a predetermined volume of solution 103 into the bag (Figure 9D).

The same sequence can be followed up to Figure 9C using the syringe 82 of Figure 8C with the needle 89. The piston-seal 90 is self-closing when the needle 96 is withdrawn, enabling the components 81 and 83 to be removed once the valve 98 has been closed. The syringe 82 can then be fitted into devices which perform the injection with a degree of automation; or it can be equipped with a simple piston rod.

A rather different embodiment is shown in Figure 10A, 10B and 10C. Instead of the bottle 81 there is a flame-sealed glass ampoule 110 with a tapering head 111 separated from the main cylindrical body by a neck 112. This neck 112 has to be broken for use. The syringe (not shown) is the same as before, but the coupling element 113 is modified to co-operate with the ampoule 110 after removal of the latter's head 111. It has an elongated cap 114, instead of the short cylindrical cap 101, with internal annular or part annular ribs 115 to fit tightly in a leak-proof manner around the main body of the ampoule, as shown in Figure 10C.

In the embodiment of Figure 11 a cartridge 120 has a neck 121 which forms an integral coupling element. This screws into a piston-seal 122 of a syringe 123 in the manner described above, its spigot 124 seating in a recess 125 just short of a pre-cut slit 126 to form a leak proof engagement.

This is the storage position shown in Figure 11A.

The cartridge 120 can be screwed forward for the nose 124 to penetrate through the slit 126, and when the assembly is axially compressed (Figure 11B) mixing of the components can take place in the cartridge 120, with the trapped gas under pressure.

The cartridge 120, now uppermost, can be released in a controlled manner to fill the syringe 123 with the desired amount of dose (Figure 11C). At any selected point, the cartridge 120 can be unscrewed from the piston-seal 122 and the slit 126 will re-close, leaving the syringe as in Figure 11D.

The cartridge need not be totally removed; it can be partially unscrewed to the Figure 11A position where it can act as the plunger rod for the syringe when that is equipped with a needle 127 (Figure 11E).

CLAIMS

1. A fluid transfer assembly comprising a body with a chamber closed by a resilient plug presenting a socket to the exterior, and a connector with a passage therethrough co-operable with the plug for a leading spigot to enter the socket and penetrate further through the plug to open communication between the passage and the chamber while the portion to the rear of the spigot screws into the socket and forms a seal before the leading end of the spigot enters the chamber.

2. A fluid transfer assembly as claimed in Claim 1, wherein the socket has a complementary screw thread for engagement by the screw thread of the connector.

3. A fluid transfer assembly as claimed in Claim 2, wherein the socket wall is plain and the connector has a self-tapping thread that bites into the relatively soft material of the plug.

4. A fluid transfer assembly as claimed in Claim 3, wherein between the self-tapping thread and the spigot there is a widened portion which can snap through the neck of the socket (into which the screw thread bites) to enter a widened base of the socket to make the connector captive to the plug.

5. A fluid transfer assembly as claimed in any preceding claim, wherein there is a pre-cut slit between the base of the socket and the inner, chamber end of the plug that self-seals in the absence of the spigot but which allows the

penetration of the spigot.

6. A fluid transfer assembly as claimed in Claim 5, wherein the socket has a central narrow recess in its base leading to the pre-cut slit, the spigot fitting snugly into this recess before it is advanced into the slit.

7. A fluid transfer assembly as claimed in any one of Claims 1 to 4, wherein the spigot is of needle form and the screw action causes the needle tip to pierce the plug between the base of the socket and the inner, chamber end of the plug.

8. A fluid transfer assembly as claimed in any preceding claim, wherein the body is tubular and the plug is slidable therein but resistant to rotation.

9. A fluid transfer assembly as claimed in Claim 8, wherein the body and connector form a syringe, the connector having a needle at the opposite end of the passage from the spigot.

10. A fluid transfer assembly as claimed in any one of Claims 1 to 7, wherein the body is a bottle and the plug seals the mouth of the bottle.

11. A fluid transfer assembly as claimed in any preceding claim, and including a further body with a chamber closed by a plug, wherein the connector is adapted to fit sealingly to this further body and simultaneously penetrate the plug to put the end of the passage remote from the spigot in communication with the chamber of the further body.

12. A fluid transfer assembly as claimed in Claim 11, wherein the plug of the further body presents a socket to

the exterior and the connector has screw engagement therewith in a manner similar to its engagement with the plug of the first body.

13. A fluid transfer assembly as claimed in Claim 11, wherein the plug of the further body has a thin section penetrable by a sharpened spigot at said remote end of the passage, simultaneous with a snap or press fit of the connector with the further body.

14. A fluid transfer assembly as claimed in Claim 11, 12 or 13, wherein one body is as claimed in Claim 8 and the other body is as claimed in Claim 10, enabling material in the tubular body to be mixed with material in the bottle.

15. A fluid transfer assembly as claimed in any preceding claim, wherein the connector has a valve to open or close the passage.

16. A fluid transfer assembly as claimed in Claims 1 to 9, wherein the end of the passage remote from the spigot opens into a socket that sealingly receives a glass ampoule.

17. A fluid transfer assembly as claimed in Claim 8, wherein the body and connector form a syringe, the body having a needle at the end opposite that which the connector enters to mate with the plug.

18. An assembly for making the needle of a syringe safe after use, the assembly comprising a needle holder that fits tightly to the forward end of the body of the syringe, and a sleeve which houses the holder and which, in an in use position, shrouds said forward end and secures to the body of the syringe rearwardly of the holder, a needle of the

holder then projecting forwardly clear of the sleeve, wherein the sleeve is removable forwardly from the syringe body, that removal dislodges the needle holder when the sleeve has moved sufficiently to shroud the needle, and the needle holder is retained by the sleeve with the needle shrouded when removal is complete.

19. An assembly as claimed in Claim 19, wherein the rear end of the sleeve is reduced to present an internal shoulder which dislodges the needle holder on removal.

20. An assembly as claimed in Claim 19, wherein the reduced rear end portion of the sleeve is a tight fit onto the body of the syringe.

21. An assembly as claimed in Claim 20, wherein the holder fits firmly into the sleeve immediately forward of the shoulder and is thereby retained after removal.

22. An assembly as claimed in Claim 19, wherein the reduced rear end portion of the sleeve screws onto the body of the syringe.

23. An assembly as claimed in Claim 22, wherein the sleeve is internally screw threaded forward of said shoulder and the needle holder has a formation that engages this thread as the sleeve is unscrewed from the body of the syringe, the retention of the needle holder after removal being by the engagement of said formation with the screw thread.

24. An assembly as claimed in any one of Claims 18 to 23, wherein a needle cap covers the needle before use, its rear end being retained between the needle holder and the sleeve.

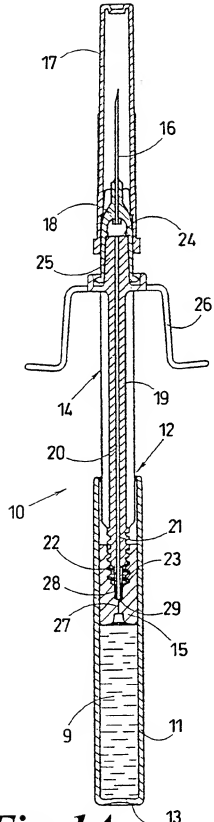

Fig. 1A

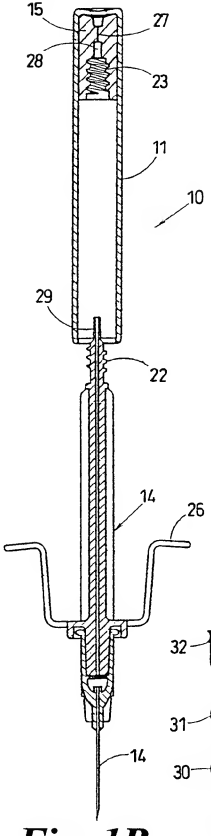

Fig. 1B

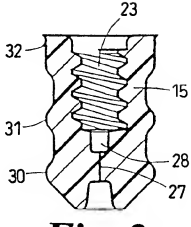

Fig. 2

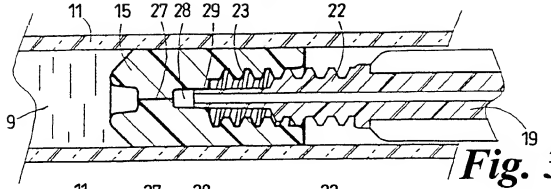

Fig. 3A

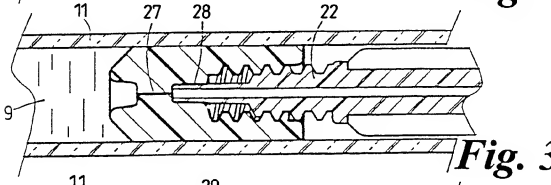

Fig. 3B

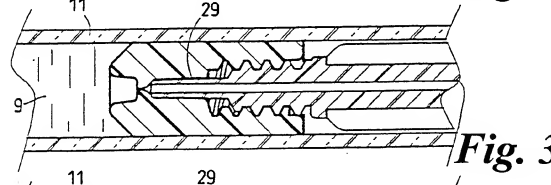

Fig. 3C

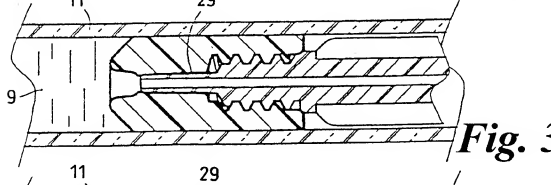

Fig. 3D

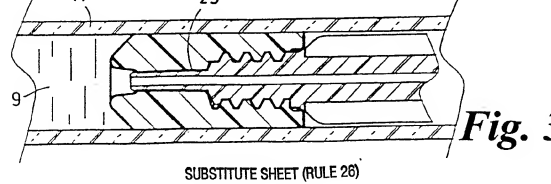

Fig. 3E

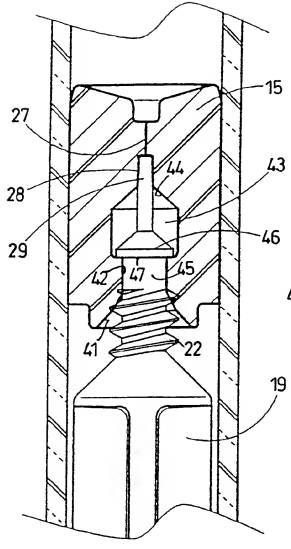

Fig. 4A

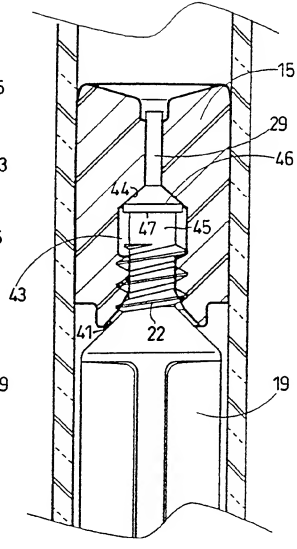

Fig. 4B

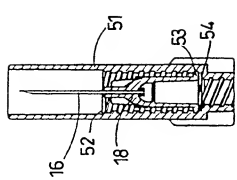

Fig. 6B

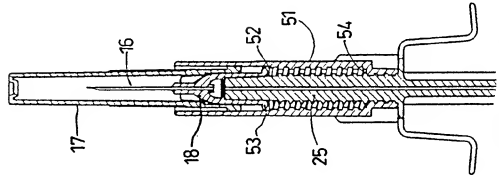

Fig. 6A

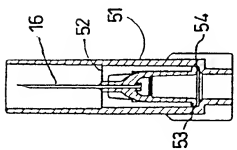

Fig. 5B

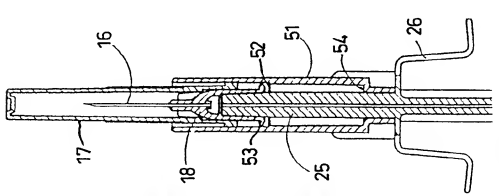

Fig. 5A

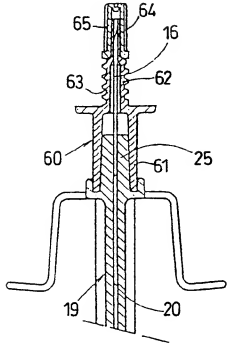

Fig. 7A

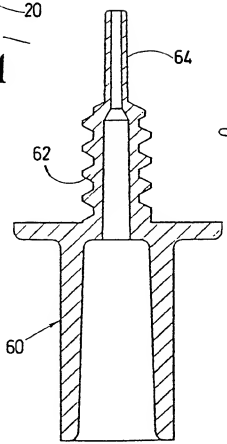

Fig. 7B

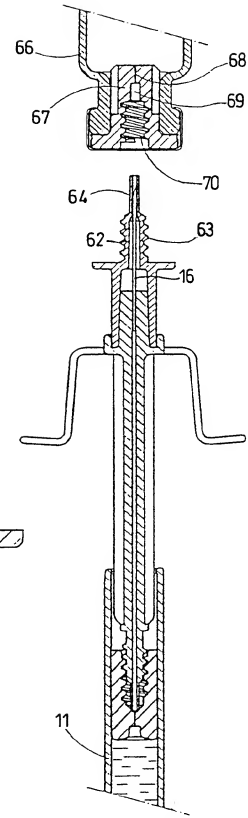

Fig. 7C

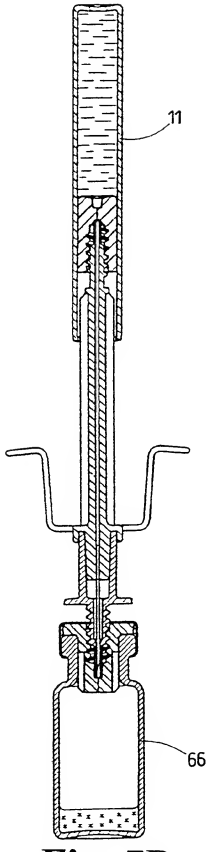

Fig. 7D

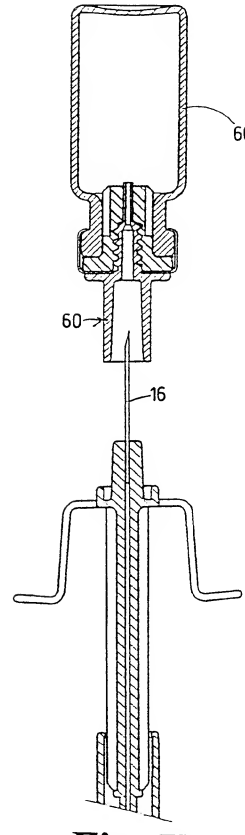

Fig. 7E

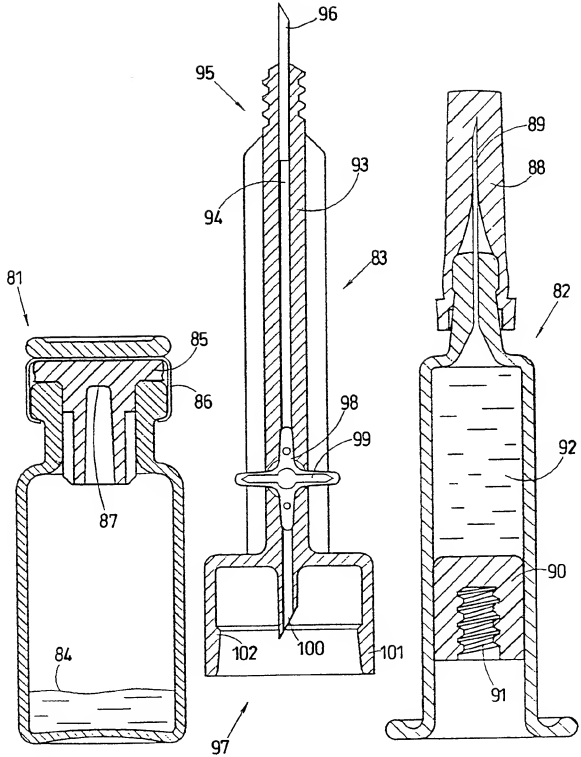

Fig. 8A *Fig. 8B* *Fig. 8C*

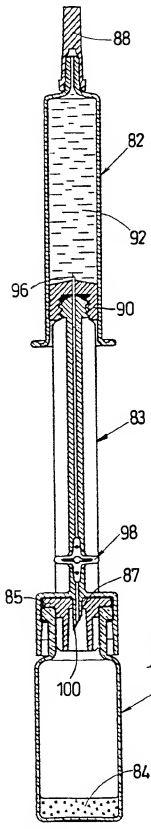

Fig. 9A

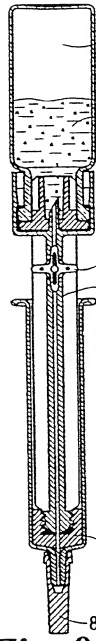

Fig. 9B

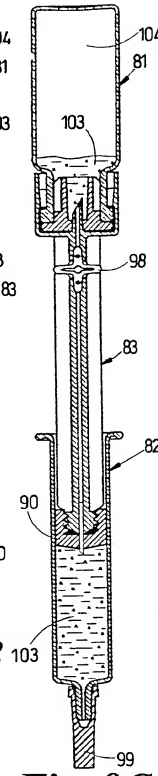

Fig. 9C

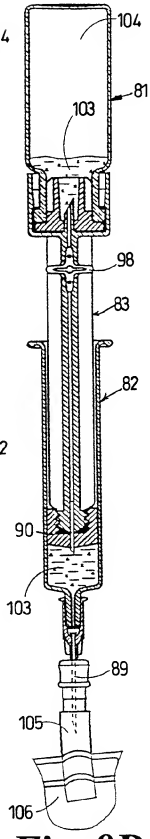

Fig. 9D

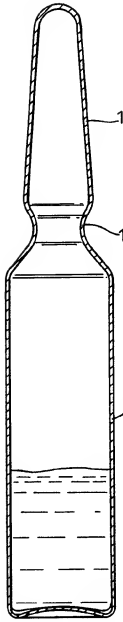

Fig. 10A

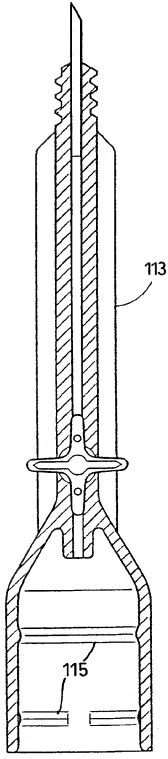

Fig. 10B

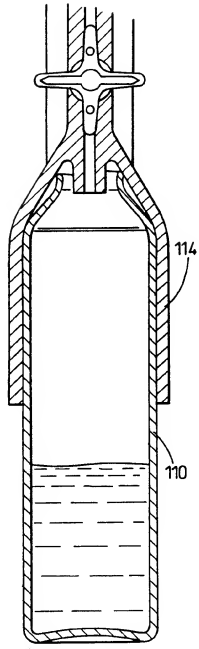

Fig. 10C

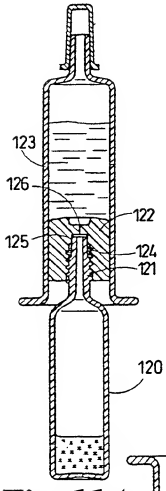

Fig. 11A

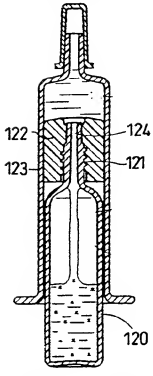

Fig. 11B

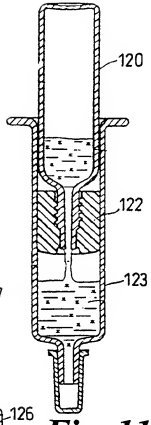

Fig. 11C

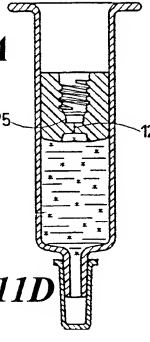

Fig. 11D

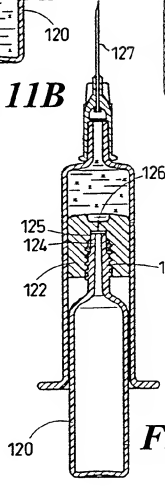

Fig. 11E

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(71) Applicant *(for all designated States except US)*: OWEN MUMFORD LIMITED [GB/GB]; Brook Hill, Woodstock, Oxford OX20 1TU (GB).

(72) Inventor; and

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(74) Agents: LAINE, Simon, James et al.; Wynne-Jones, Laine & James, 22 Rodney Road, Cheltenham, Gloucestershire GL50 1JJ (GB).

(81) Designated States: AU, JP, US, European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE).

Published

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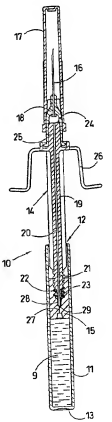
(88) Date of publication of the international search report: 6 July 2000 (06.07.00)

(54) Title: IMPROVEMENTS RELATING TO FLUID TRANFER ASSEMBLIES

(57) Abstract

A medical substance (9, 92) is contained in a body (11, 82, 123) by a plug which (15, 67, 90, 122) is penetrated rather than removed in order to extract the substance in a sterile manner. The plug (15, 67, 90, 122) has a socket (23, 70, 91) open to the exterior and a connector (14, 60, 82, 120) has a screw threaded nose (22, 62, 95, 121) which engages therein, either by screwing into a complementary thread or by self tapping. The plug (15, 67, 122) may have a pre–cut slit (27, 68, 126) through it from the base of the socket (23, 70) and as the connector screws in a spigot (29, 64, 124) on its extremity works through the slit. A passage (20) through the spigot and nose is then available to the substance. When the connector is unscrewed, the slit closes up. Alternatively, the nose (95) may carry a hollow needle (96) which pierces its way through the plug (90). The plug may be a piston–seal (15, 90, 122) of a syringe or the cap (67) of a bottle (66). The connector may be a transfer device (83, 113) connectable to another body (81, 110) containing a substance to be mixed with the first substance before use.



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INTERNATIONAL SEARCH REPORT

Internr al Application No
PCT/GB 99/02904

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 A61M5/28 A61M5/315

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 A61M A61J

Documentation searched other then minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5 775 506 A (GRABENKORT RICHARD W) 7 July 1998 (1998-07-07) column 3, line 57 -column 4, line 15 figures 4,6	1,2,5, 7-13,17
Y		3,4, 12-14,16
X	EP 0 264 273 A (DAIKYO GOMU SEIKO KK) 20 April 1988 (1988-04-20) figure 2	1,7-11, 17
Y	GB 836 279 A (AMERICAN HOME PRODUCTS CORPORATION) 1 June 1960 (1960-06-01) page 2, line 95 - line 101; figure 10	3
	-/--	

[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

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Date of the actual completion of the international search	Date of mailing of the international search report
21 December 1999	18 04 2000
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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	WO 95 32015 A (MEYER GABRIEL) 30 November 1995 (1995-11-30) page 15, line 28 -page 16, line 12 figures 23-26	4
Y	US 5 569 191 A (MEYER GABRIEL) 29 October 1996 (1996-10-29) abstract; figures 1-4	12-14
Y	US 3 659 602 A (CLOYD HAROLD S) 2 May 1972 (1972-05-02) figure 1	16
A	FR 1 130 413 A (FARBWERKE HOECHST AG) 5 February 1957 (1957-02-05) page 2, left-hand column, line 11 - line 24; figures	3

2

INTERNATIONAL SEARCH REPORT

International application No.
PCT/GB 99/02904

Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. ☐ Claims Nos.:
because they relate to parts of the international Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:

3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1. ☐ As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.

2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.

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4. ☒ No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

1-17

Remark on Protest

☐ The additional search fees were accompanied by the applicant's protest.

☐ No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

1. Claims: 1-17

   Fluid transfer assembly

2. Claims: 18-24

   assembly protecting the needle of a syringe

INTERNATIONAL SEARCH REPORT

mation on patent family members

Internat Application No
PCT/GB 99/02904

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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